

Serial No.: 09/803,432

Examiner: A. Ly

Title: TWO DIMENSIONAL PHASED ARRAYS FOR VOLUMETRIC ULTRASONIC INSPECTION AND METHODS OF USE

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REMARKS/ARGUMENTS

Reconsideration is requested in view of the following remarks. Claims 1, 18 and 37 have been editorially revised. Support for the revisions to claims 1, 18 and 37 can be found in Figures 3 and 4, as well as in paragraphs 34 and 36 on page 8 of the specification. Claim 2 has been editorially revised to track the revision of claim 1. Claims 26, 34 and 36 have been editorially revised to track the revision to claim 18. Claims 40 and 42 have been editorially revised to track the revision to claim 37. Claim 41 has been canceled. Claims 43-45 have been newly added. Support for claims 43-45 can be found in paragraph 36 on page 8 of the specification. Claims 1-4, 7-23, 25-34, 36-40 and 42-45 are pending in the application.

Claim Rejections – 35 USC §102

Claims 1-4, 7, 11-23, 33 and 37-38 are rejected under 35 U.S.C. §102(b) as anticipated by Alexandru (US 6,089,096). Applicants respectfully traverse this rejection.

The invention of claim 1 is directed to a method for performing an ultrasonic volumetric inspection of a backscattering material. The method claims providing a two-dimensional ultrasonic phased array, the phased array includes a plurality of ultrasonic elements arranged in a two-dimensional rectilinear grid pattern extending in azimuthal and elevational directions, each ultrasonic element has an overall elevational dimension that is greater than its overall azimuthal dimension, the two-dimensional ultrasonic phased array configured with no more than one focusing lens curved solely in the elevational direction to direct each ultrasonic element in each respective column to a desired elevational location.

Alexandru discloses a two-dimensional ultrasonic imaging array having variable focusing abilities in both the azimuthal and elevational directions and an adjustable aperture. Alexandru teaches two-dimensional arrays of small square elements, and also teaches that the elevational size of the elements may be substantially increased relative to their azimuthal size if only focusing, not steering, needs to be achieved (column 2, lines 34-37). Alexandru thus teaches away from using elements in which the elevational size of the elements is substantially increased relative to their azimuthal size when both

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focusing and steering needs to be achieved. In contradistinction, the invention of claim 1 requires that each ultrasonic element has an overall elevational dimension that is greater than its overall azimuthal dimension, and further requires applying modulation to each of the ultrasonic elements in both the azimuthal and elevational directions to form an ultrasonic scanning beam configured to produce focal zones in an azimuth-depth plane and an elevational-depth plane. Further, Alexandru discloses that lenses can be combined to enhance the focusing. In contradistinction, the claimed invention requires no more than one focusing lens. These claimed features are depicted for one embodiment in Figures 3 and 4. Nowhere does Alexandru disclose or suggest providing a two-dimensional ultrasonic phased array, the phased array includes a plurality of ultrasonic elements arranged in a two-dimensional rectilinear grid pattern extending in azimuthal and elevational directions, each ultrasonic element has an overall elevational dimension that is greater than its overall azimuthal dimension, the two-dimensional ultrasonic phased array configured with no more than one focusing lens curved solely in the elevational direction to direct each ultrasonic element in each respective column to a desired elevational location as claimed in claim 1.

The foregoing arguments apply equally to claims 18 and 37 since claims 18 and 37 also claim a two-dimensional ultrasonic phased array, the phased array includes a plurality of ultrasonic elements arranged in a two-dimensional rectilinear grid pattern, each ultrasonic element has an overall elevational dimension that is greater than its overall azimuthal dimension, the two-dimensional ultrasonic phased array configured with no more than one focusing lens curved solely in the elevational direction to direct each ultrasonic element in each respective column to a desired elevational location as recited in claim 1.

For at least these reasons, claims 1, 18 and 37 are patentable over Alexandru. Claims 2-4 and 11-17 are also patentable over Alexandru since they depend ultimately from claim 1 that is allowable. Claims 19-23 and 33 are patentable over Alexandru since they depend ultimately from claim 18 that is allowable. Claim 38 is patentable over Alexandru since it depends from claim 37 that is allowable. Newly added claims 43-45

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are also patentable over Alexandru since they depend from claims 1, 18 and 37 respectively that are allowable.

Claim Rejections -35 USC §103

Claims 34, 36 and 41-42 are rejected under 35 U.S.C. §103(a) as unpatentable over Alexandru in view of Applicants' admissions. Applicants respectfully traverse this rejection for the same reasons discussed above regarding the rejections of claims 1, 18 and 37. For at least these reasons, claims 34 and 36 are patentable over Alexandru in view of Applicants' admissions since they depend ultimately from claim 18 that is allowable. Claim 42 is patentable over Alexandru in view of Applicants' admissions since it depends from claim 37 that is allowable. Claim 41 has been canceled, thus rendering this claim rejection now moot. Applicants do not concede the correctness of the rejections as applied to the remaining features of the rejected claims.

Claims 8-10 and 27-32 are rejected under 35 U.S.C. §103(a) as unpatentable over Alexandru in view of Entrekin et al. (US 5,305,756). Applicants respectfully traverse this rejection for the same reasons discussed above regarding the rejections of claims 1, 18 and 37. For at least these reasons, claims 8-10 and 27-32 are patentable over the cited art, alone or in combination, since claims 8-10 and 27-32 depend ultimately from claims 1 and 18 respectively that are allowable. Applicants do not concede the correctness of the rejections as applied to the remaining features of the rejected claims.

Claims 25-26 and 39-40 are rejected under 35 U.S.C. §103(a) as unpatentable over Alexandru in view of Smith et al. (US 4,890,268). Applicants respectfully traverse this rejection for the same reasons discussed above regarding the rejections of claims 1, 18 and 37. For at least these reasons, claims 25-26 and 39-40 are patentable over the cited art, alone or in combination, since claims 25-26 and 39-40 depend ultimately from claims 18 and 37 respectively that are allowable. Applicants do not concede the correctness of the rejections as applied to the remaining features of the rejected claims.

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Favorable reconsideration in the form of a Notice of Allowance is requested. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at (507) 351-4450.

Respectfully submitted,

Dated: 12-18-2006

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